Stated Meeting, October 17, 1862.

Present, sixteen members.

Professor CRESSON, Vice-President, in the Chair.

Donations for the Library were received from the Boston Natural History Society, the publishers and editors of the American Journals of Science and of the Medical Sciences, the Smithsonian Institution, Mr. Jules Marcou, and Dr. Roehrig.

A letter was read from Mr. Samuel Powel, dated Bethlehem, Pa., October 15th, 1862, accompanying and describing specimens of iron manufactured from the slag obtained from the Zinc Works of the New Jersey Zinc Company, through one of its members, Captain James Jenkins, of Elizabeth City. Remarks upon this ore and its locality, and the history of its use were made by Professor Trego, Dr. Hays, and Professor Lesley.

In Sussex County, New Jersey, are the mines of Franklinite ore, from which the products are derived. In the process of manufacturing oxyd of zinc, there remains a scoria which is rich in iron. From the treatment of this scoria in the blast furnace arises the iron which I send you.

In the first place there is a specimen of black, porous, spongy-looking pig iron. This is the product of first blowing in the furnace with charcoal. Although so different from the white, lustrous, and largely crystalline specimen which accompanies it (which is the next product of the same furnace and ore (scoria), when it comes into full blast with anthracite), the black, spongy ore *behaves* in the same peculiar way which characterizes the white pig, when it is attempted to be made into castings by any process.

The uniform character of the castings made from either of these pig metals is as follows: they are hard, white, and brittle, and largely crystalline. Also, where the furnace has an overcharge of ore, it will produce a No. 2 pig, which is very light gray, and finely granulated, but which will still make the same sort of castings. The appearance of the white pig is so remarkable, that I think few people conversant with pig iron would guess it to be iron. I do not believe

that its peculiarity depends upon the presence of zinc, but I suspect it contains manganese. These irons would then seem totally unfit for ordinary castings, for even when mixed with other pig iron, it is impossible to work them for castings. On one occasion, in attempting to make a roll in this way, which was afterwards broken, the white iron had disposed itself about the surface, and it was then attempted to repeat the experiment, but no such disposition of the hard iron could again be obtained.

For the purpose of being worked as malleable cast iron, its first remarkable and valuable properties begin to appear. I send you two fragments of a cast iron stirrup made in this way. It is hard and strong when cold like steel. The larger piece has been in one place drawn out, hardened, tempered, ground, and sharpened as a knife-blade, which has quite a good edge. Thus you see it is malleable, and is in fact *a steel.* The other and smaller fragment of the same cast iron stirrup is welded to a small piece of a nail-rod. Thus it has all the requisites for the best quality of malleable cast iron work, with the peculiar steel-like character, only it is not capable of bending when cold as malleable iron.

The small, square cake of coarse-looking iron, is a piece of the common puddled bar made from the white cast iron. It appears here as already a good quality of iron in the first stage of refining.

Next I send you a loop of round bar iron, about one and a half inch round iron, which has been, I should think, nine inches long. Captain Jenkins saw this specimen bent in the form you see it *entirely cold.* The two ends are in contact, and the opening in the centre of the loop is about five-eighths of an inch. It is impossible to find a more remarkable evidence of the toughness of a specimen of wrought iron in the cold. The outer curve of the bend is perfectly unblemished. The cut and fractured ends speak for themselves.

Next I send you a sample of octagon cast steel, which was made from the puddled bar iron in black lead crucibles. This was done at Sufferns or Ramapo, New Jersey. I send you also, through the kindness of the Captain, the formula for the steel charge in black lead crucible, viz.:

40 pounds of iron.
½ oz. yellow prussiate of potash.
1 oz. sal ammoniac.
8 oz. charcoal.
1 gill of salt.
3½ oz. manganese.

I send you also the analysis of the white pig of the New Jersey Zinc Company.

Iron,	88.30
Carbon, chemically combined,	5.48
Carbon, free or graphite,	0.00
Silicum (sic),	0.20
Manganese,	4 50
Sulphur,	0.08
Phosphorus,	0.15
Zinc,	0.30
Loss,	0.99
	100.00

This curious iron has become in my eyes still more important, since I found a recent notice of Mr. Krupp, of Essen in Prussia, who has sent to the London Exhibition some important productions of his wonderful steel works, such as huge ordnance, shafting, &c. The notice of Krupp states, that his steel is produced from a German ore of zinc and iron, and it, doubtless, therefore must resemble this Franklinite of New Jersey. I need make no remark in this connection, to convince you of the immense importance of a production which may possibly enable America to enjoy the advantages of such manufactures as those of the Essen Works, which are now without a rival in the world.

I may add that the malleable iron stirrup was made by Messrs. Bruen, by the same process and side by side with other castings made of the usual Sterling white iron. The Sterling iron made cold, tough, malleable castings, and *our* new iron made them all like the stirrup. For these malleable articles, the pig iron is first melted in an air furnace on the hearth, and cast into plates, which are broken up and re-melted in a cupola for casting.

Another remarkable, and I believe, unique property of the white pig iron, has been made the subject of a patent. The pig iron, when coarsely pulverized, and sprinkled upon a bar of wrought iron, heated quite red, or approaching white, melts, forms a union with the surface, *and flows entirely over it*, producing a sort of case-hardened enamel, which resists the edge of tools.

It occurs to me that this property might be of use in uniting such enamelled surfaces to cast iron, poured upon them in the mould, or for various other purposes.

Dr. Emerson referred to a pamphlet recently published by

him, concerning the culture of cotton in the Middle States; and mentioned the fact, that the growth of cotton in Maryland, Virginia, and Delaware is no new thing, it having been raised there to a limited extent since 1786. Dr. Emerson remarked, that he himself had this season raised cotton from the seed in Kent County, Delaware, planted May 5th, and he presented to the Society some specimens from his crop. He believes that the culture of cotton in Northern localities may be more successfully attempted than formerly, on account of the use which may now be made of concentrated fertilizers, such as superphosphate of lime, &c. Dr. Emerson added, that potash had been recently obtained by separation from the other ingredients, in the greensand marls of New Jersey, at a cost of four and a half cents per pound for the potash.

A letter was read describing an accompanying specimen of jasper, from the lately discovered cave in New Hampshire, whence the Indians of New England are supposed to have obtained their arrow-heads and flint instruments. The cave is an artificial excavation, twenty-eight feet long, twelve wide, and eight or ten high, with a narrow mouth in a jasper vein, inclosed in the "granite" of a steep mountain spur, on the banks of the Androscoggin, one and half miles from Berlin Falls.

Pending nominations Nos. 456 to 465 were read, and there being no further business before the meeting, the Society proceeded to ballot for candidates for membership, after which, the following named gentlemen were declared by the presiding officer to be duly elected.

Dr. Evan Pugh, Principal of the Farmers' H. S., Penna.
Dr. A. A. Henderson, U. S. N.
Robert Cornelius, of Philadelphia.
Dr. Prof. Rudolph Virchow, of Berlin.
Dr. Prof. Fred. Theo. Frerichs, of Berlin.
Thomas Jefferson Lee, T. E. U. S.
Dr. Prof. Louis Stromeyer, of Hanover.
Dr. Prof. Karl Rokitansky, of Vienna.
Henry Winsor, of Philadelphia.

And the Society was adjourned.